15-1134

FREQUENTLY ASKED QUESTIONS CONCERNING HOT IN PLACE ASPHALT RECYCLING

Q. What is Hot in Place Asphalt Recycling?

A. Per the Asphalt Recycling and Reclaiming Association (ARRA) definition, Hot In-Place Recycling (HIR) is an on-site, in-place method that rehabilitates deteriorated bituminous pavements and thereby minimizes the use of new materials. Basically, this process consists of four steps:

1. softening of the asphalt pavement surface with heat
2. scarification and/or mechanical removal of the surface material
3. mixing of the material with recycling agent, asphalt binder, or new mix; and
4. laydown and paving of the recycled mix on the pavement surface

The Asphalt Recycling and Reclamation Association (ARRA) recognizes three basic types of hot in-place recycling processes

1. surface recycling
2. repaving
3. remixing

Q. What is the Hot-in-Place Recycling **SURFACE METHOD?**

A. The Surface Method is an on-site, in place, pavement rehabilitation method that consists of heating, scarifying (by viscous shearing thereby maintaining the structural integrity of the asphalt because the aggregate is not being broken) or milling, adding a rejuvenating agent (Gallagher Asphalt uses polymer modified oil), mixing, placing, and re-compacting the existing bituminous pavement.

Q. What are the steps involved with the Conventional Heater Scarification **SURFACE METHOD?**

A. the following steps all take place within the limits of the 325 lf moving work zone of the Gallagher Asphalt Heater Scarification process

1. Clean the road surface with a power broom removing all loose debris and organic material.
2. Pre-Heater takes pavement surface temp to 180 – 200 degrees
3. A 2nd Heater takes surface pavement temp to 280 – 325 degrees with a heat penetration depth of 4 – 6 inches.
4. Introduction of the performance grade oil rejuvenating agent.
5. Spring-loaded tines are hydraulically set at the prescribed depth scarify (viscously shear) the existing road surface performing the first mix and will drag over existing structures to avoid damage.
6. Full width reversible and continually moving augers complete the mixing of the hot scarified asphalt and rejuvenating agent and redistribute rejuvenated asphalt back to existing grade and cross slope. Minor re-profiling with standard paving screed can be accomplished.
7. Compaction.
8. Open to Traffic.

9. The now re-plasticized asphalt is ready to receive its final surface course; such as:
   - HMA overlay
   - Slurry Surface
   - Micro-surface
   - Chip Seal

Q. What is the **Re-HEAT** Method?
A. Re-HEAT is an on-site, in place, pavement rehabilitation method that consists of **heating** the existing pavement, viscously shearing and **removing** the top surface course(s), **adding** a hot asphalt rejuvenating oil, **mixing** (30 – 40s)the material uniformly in an on-board heated mixing drum, **re-laying** the recycled material, followed by **compacting**. The road is now ready to stripe for traffic. **No** additional surface treatment is needed.

Q. What are the steps involved with the Re-HEAT process?
A. The following steps all take place within the limits of the 325 lf moving work zone of the Re-HEAT process

1. The road surface is cleaned with a power broom to remove any loose debris and organic material.
2. The road surface is softened with radiant convection heat.
3. A rotary blade system viscously shears and dislodges the material for processing.
4. The dislodged, hot asphalt is lifted into an on-board heated mixing drum where rejuvenating agent is injected to reconstitute and rejuvenated the existing asphalt.
5. An on-board heated mixing plant uniformly blends the rejuvenating agent with the old asphalt for a period of 30 – 40 seconds ensuring a complete mixing.
6. The rejuvenated asphalt is delivered by conveyor belt back to the on-board paving screed where it is immediately placed to the correct slope and grade.
7. While still hot, the newly recycled / rejuvenated asphalt pavement is rolled and compacted to the specified density.
8. Open to Traffic.

Q. Who in the area can do Hot in Place Asphalt Recycling (HIR)?
A. Gallagher Asphalt Inc. out of Thornton Ill.

Q. How long has Gallagher been in Business?
A. Gallagher Asphalt is the largest asphalt company in the Chicago area and has been in business since 1928. They are a third generation, family owned, operated, and managed company and are the largest asphalt paver in the state of Illinois.

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Q. How long has Gallagher been doing Hot in Place Recycling?
A. Gallagher has been a Hot in Place Asphalt Recycler for almost 40 years and is now the third largest asphalt recycler in the country.

Q. What type of surface defects / imperfections will HIR address?
A. Any type that is addressed by milling / filling is addressed by HIR. Rutting (typically up to 3 inches), shoving, raveling, cracking (block, alligatoring, transverse, longitudinal), minor re-profiling. Basically all surface defects are corrected and deeper cracking is retarded.

Q. Who in the area has used the Hot in Place Asphalt Recycling Process?
A. In Wisconsin: Waukesha County has been using the process to address their road needs for the past 11 years. The City of Mequon used the process in 2006 and 2008, the City of Milwaukee in 2012, the city of Greenfield in 2011 and 2013, Manitowoc County in 2014 and 2015, Milwaukee County in 2014, the Village of Menomenee Falls in 2014, and the City of Sheboygan in 2015.
In Minnesota: Washington County, Wilkin County, and St. Louis County.

Q. Why is a surface treatment required or recommended for the Heater-Scarified method?
A. Asphalt ages and breaks down primarily as a result of UV rays, weather, and traffic loading. The UV rays impact the asphalt oil causing it to lose its elasticity. As a result the surface asphalt becomes brittle and starts to break down and crack. When this happens some of the aggregate fines are lost and the deterioration process is accelerated due to traffic loading, water penetration and the freeze thaw process. The HIR process with the performance grade oil rejuvenating agent does not replace or completely make up for these lost fines and as such the finished product is slightly more open (porous) then desired for a finish surface course. The process essentially transforms the existing surface layer to a new high quality leveling course layer. So a surface treatment is needed to close up the minor surface pores and prevent unwanted water penetration. The performance grade oil rejuvenating agent does help to minimize the openness of the finished product and improve the elasticity and cohesion of the asphalt.

Q. Is the HIR process a proprietary process there by limiting the number of contractors who may be eligible to bid on a project?
A. No. There are other contractors throughout the country and mid west capable of providing a similar finished product.

Q. How is the contracting for HIR handled?
A. In the same fashion as any other type of government contracting. There is a generic specification (in a word document format) for the process that can be adapted to fit most any

type of contracting format. There are three basic contracting methods: 1. The Hot in Place process is a sub contractor on the project. 2. The Contractor performing the Hot in Place process is the prime contractor; or 3. The Hot in Place work and the surface treatment work are bid out and managed separately.

Q. What type of surface treatment is best?
A. This decision is for the owner to decide and is usually based upon a number of criteria such as: Existing and predicted ADT's and ESAL's, overall structural integrity of the existing road system, classification of the road, vertical alignment issues, pre-HIR road condition, and organization policy and/or political direction.

Q. Won't the cracking come back?
A. Yes. Over a period of time the deeper more sever cracks will re-appear but usually in a less defined manor, as it will with any type of surface reconditioning / rehabilitation process like mill and fill. A number of conditions will impact the timeline for the return of the cracking with any process used. For example: 1.The percentage of depth of the existing pavement that the HIR process will address. The greater the percentage the longer it will take for the cracks to return. 2. The type of surface treatment used. Cracks will take longer to re-appear with an asphalt overlay then with a simple seal coat. What has been our experience is that with an overlay it will take 2 – 3 years for the normal cracking to begin to re-appear. The larger the original crack obviously the more likely it is to reappear.

Q. When is the best time of year to do HIR?
A. HIR can be done most any time of the year. In emergency situations it can even be done in the winter. However the hotter the ambient temperature and as such the pavement itself the better because the pre-HIR asphalt surface will be hotter and therefore the applied heat will penetrate deeper. A minimum ambient air temperature of 55 degree F and rising is preferred.

Q. How much road surface can be treated in a given day?
A. The Heater Scarification process "train" travels up to 15 feet per minute. So on average approximately 10,000 to 11,000sy of road surface can be treated in a given day. This equates to approximately .75 miles of 24 foot wide road surface per day. The Re-Heat process is a slower process and can accomplish up to approximately 4500sy per day.

Q. How does HIR compare to a traditional mill and fill?
A. Extremely well, with the HIR heater scarification process will save approximately 30% in cost and up 50% in time with no road closures. The FHWA does not recognize any performance difference between HIR and that of a mill and fill.

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Q. How much does the HIR process cost?
A. Currently (the 2015contract season) the HIR Heater-Scarified process ranged in price between $4.40 and $4.65 depending on project size and complexity so for a budgeting purpose for 2016 a SY price of $4.75 would be advised for the Heater Scarification process and $13.50 per SY for the Re-HEAT method depending on road conditions and in-road obstructions such as manholes, valve boxes, and storm grates.

Q. Is there a minimum quantity needed for the HIPR process?
A. Generally we like to have a minimum of one week's worth of work on a contract in order to make it cost effective to mobilize into an area. For the H-S process this is 50,000 SYs and for the Re-Heat process it is 30,000 SYs. If we have a sufficient contract already in the area smaller projects can be considered provided they can be accomplished without having to remobilize into the area.

Q. What type or condition of road is suited for the HIR process?
A. A road with the following characteristics would benefit from the HIR process.

- Any HMA road surface with a desired 3" of mix.
- Structural or base issues need to be repaired prior to the HIR process.
- SCR of approximately 4+ but 3s can and have also be done. In general the lower the condition of the road the shorter the service life of the HIR.
- No road alignment issues.
- Only moderate to minimal crack filling has been done.
- Ruts under 4" in depth.
- Generally less then 2 chip seals have been applied.

Q. What type of conventional treatments can HIR be considered as a viable alternative to?
A. Excellent alternative to:

* Mill and Fill
* Overlay
* Wedge and overlay
* Extensive crack filling

Q. Is there a minimum depth of asphalt that must exist for HIR to work?
A. Yes. There should be at least 3" of asphalt and a sound road base in order to give adequate support for the HIR equipment. Shallower depths can be considered for the Heater – Scarification process on a case by case basis.

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Q. What type of compaction are you able to obtain with the recycled asphalt material?
A. Compaction is not an issue. Compaction in the range of 91 to 93% is common.

Q. How soon should a surface treatment be applied to the recycled asphalt after the Heater-Scarification HIR process?
A. If an HMA overlay is being applied the overlay can go down immediately after the HIR process. If the HMA overlay is placed within 2 weeks after the HIR process we have found that a tact coat is not necessary due to the improved oil content of the recycled asphalt. If a chip seal or slurry seal is to be applied we suggest a wait period of approximately 2 weeks after the HIR process has been completed. This will allow for any previous undetected base issue to arise.

Q. What type of roads are **not good** candidates for the HIR process?
A. The following are generally conditions that would make HIR a less then optimal alternative.

- Ruts greater than 4"- unless filled prior to the HIR process
- Base layer cracking with rubberized crack filler over more than 25% of road surface. This is a lot of crack fill material. Normally crack fill material is not an issue but when large amounts are present special considerations need to be made.
- Structural / Base issues for more than 35% of road surface. From a cost- benefit aspect it might be better to perform an FDR in this type of situation. However HIR after the base patching / repair is completed is certainly a viable option.
- Asphalt thickness less than 3".
- HMA Base with generally more than 2 good layers of Chip Seal or similar surface treatment. This is not guaranteed to be a "deal breaker" but the oil used in the chip seal process tends to be problematic.
- Roads comprised of multiple layers of chip seal or similar construction methods.
- Cul de Sacs with a radius under 45'
- Parking Lots. Unless the parking lot is very large and open.

Q. Does the road have to be closed for the HIR process?
A. No. That is one of the benefits of this process is that it is a moving process and can be accomplished under traffic

Benefits of Hot in Place Asphalt Recycling

- Recycles / Rejuvenates the surface course (1.5 to 2" depth) in Place.
- Hot in-place recycling effectively addresses the classic symptoms of deteriorated oxidized pavement.
- The stone and aggregate of the existing asphalt is preserved maintaining the structural integrity of the mix design.
- All defects of the surface mat are corrected leaving a seamless rejuvenated mat upon completion.
- No Foreign Object Debris (FOD) is generated.
- Non-destructive rehabilitation of asphalt surface with no negative impact to underlying layers.
- Substantial cost savings over more traditional techniques such as milling and filling.
- Environmentally friendly: Reduced carbon footprint and Reduced Green Gas Emissions by up to 65% as compared to mill/fill with 20% RAP overlay.
- Can be used on any HMA surface.
- Can be used on rural or urban cross sections.
- ADT's not an issue.
- Minimal traffic impact – no road closure.
- Significantly less interruption and impact to neighborhood, and existing infrastructure.
    - No trucking associate with the mill / fill operation
    - Reduced noise
    - No dust generation
- Time to completed finished product is reduced.
- Existing manholes, valve boxes, and other in road structures are not impacted.
- Density is maintained or potentially improved
- Anti rutting characteristic of the asphalt is improved.
- Deep cracks are interrupted, retarded, and/or filled.
- Aggregate stripped of the bitumen is remixed and recoated.
- Ruts and holes are filled, shoves and bumps are leveled, and drainage and crowns are re-established.
- Flexibility is restored by chemically rejuvenating the aged and brittle pavement.
- Aggregate gradation and asphalt content may be modified by some variations of this process.
- Highway safety is enhanced through improved skid resistance and smoother ride.